Hogan & Hartson 81864.0026 Gouichi MISHIZAWA et al. Method for Manufacturing a R-T-B... EV 324 110 454 US 17 Drawing Sheets; Sheet 1 of 17

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合金a1	低R合金 23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.2Al-bal.Fe(wt. %)	0.05Cu-0.2Al-bal.Fe(wt. %)
合金a2	Zr入り低R合金 23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.2Al-0.32Zr-bal.Fe(wt. %)	-0.05Cu-0.2AI-0.32Zr-bal.Fe(wt. %)
哈金 ●	Zr入り低R合金 15.7Nd-6Pr-8.1Dy-1.1B-0.05Cu-0.2Al-0.15Zr-bal.Fe(wt. %)	-0.05Cu-0.2Al-0.15Zr-bal.Fe(wt. %)
合金a4	Zr入り低R合金 23.9Nd-6Pr-1.1B-0.05Cu-0.2Al-0.15Zr-bal.Fe(wt. %)	-0.2AI-0.15Zr-bal.Fe(wt. %)
合金a5	Zr入り低R合金(高AI) 23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.42AI-0.12Zr-bal.Fe(wt. %)	-0.05Cu-0.42Al-0.12Zr-bal.Fe(wt. %)
合金a6	Zr入り低R合金(AI無) 23.6Nd-6Pr-0.3Dy-1.1B	23.6Nd-6Pr-0.3Dy-1.1B-0.05Cu-0.12Zr-bal.Fe(wt. %)
合金a7	Zr入り低R合金 27.9Nd-0.1Dy-1.1B-0.03Cu-0.05Al-0.08Zr-bal.Fe(wt. %)	Cu-0.05AI-0.08Zr-bal.Fe(wt. %)
合金a8	Zr入り低R合金 23.7Nd-6Pr-0.2Dy-1.6B-0.3Cu-0.25Al-0.3Zr-bal.Fe(wt. %)	-0.3Cu-0.25Al-0.3Zr-bal.Fe(wt. %)
合金b1	高R合金(B無) 40.6Nd-0.05Cu-5Co-0.2Al-bal.Fe(wt. %)	Al-bal.Fe(wt. %)
合金b2	Zr入り高R合金(B有) 40.6Nd-0.5B-0.05Cu-5Co-0.2Al-3.1Zr-bal.Fe(wt. %)	o-0.2AI-3.1Zr-bal.Fe(wt. %)
合金b3	高R合金(B, Al無) 40.6Nd-0.05Cu-5Co-bal.Fe(wt. %)	Fe(wt. %)
合金b4	高R合金(B無) 35.1Nd-0.03Cu-2Co-0.05Al-bal.Fe(wt. %)	5AI-bal.Fe(wt. %)
	高R合金(B無) 40.6Nd-0.3Cu-20Co-0.25Al-bal.Fe(wt. %)	5AI-bal.Fe(wt. %)

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o N	最終組成(wt. %)	酸素量 (ppm)	低R合金	高R合金	焼結温度	(kG)	HcJ (kOe)	Нк/НсЈ (%)	Br+0.1 × HoJ	CV値
_	Fe-24.9Nd-5.4Pr-0.4Dv-1B-0.05Cu-0.2Al-0.5Co	1210	合金a1	合金61	1	13.91	12.59	38	15.17	1
2	2 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.01Zr	1290				13.94	13.28	22	15.27	89
<u>. ප</u>	3 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.02Zr	1160				13.95	13.29	79	15.28	2
4	4 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.03Zr	1360		_		13.96	13.34	96	15.29	99
2	5 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.05Zr	1090	台銀a1+	\$ \$P1		13.96	13.33	96	15.29	72
9	6 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2AI-0.5Co-0.10Zr	1190	1 2	- - - - - - - - -		13.97	13.31	96	15.30	28
7	7 Fe-24,9Nd-5,4Pr-0,4Dy-1B-0.05Cu-0.2AI-0.5Co-0.20Zr	1110				13.99	13.64	97	15.35	<u></u>
<u></u>	8 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.25Zr	1320				13.94	13.75	97	15.32	66
6	9 Fe-24.9Nd-5.4Pr-0.4Dv-1B-0.05Cu-0.2Al-0.5Co-0.30Zr	1240				13.85	13.85	86	15.24	110
9	10 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.05Cu-0.2Al-0.5Co-0.05Zr	1350			1070°C	13.89	13.32	63	15.22	159
=	11 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.05Cu-0.2Al-0.5Co-0.10Zr	1400))	13.84	13.43	95	15.18	214
12	12 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.05Cu-0.2Al-0.5Co-0.20Zr	1170	合金 ^a 1	西東D 十 合金b2	-	13.78	13.56	97	15.14	257
13	13 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.05Cu-0.2AI-0.5Co-0.25Zr	1220				13.71	13.71	86	15.08	281
14	14 Fe-24 8Nd-5.5Pr-0.3Dv-1B-0.05Cu-0.2AI-0.5Co-0.30Zr	1310				13.62	13.88	86	15.01	275
5	15 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2AI-0.5Co	1888	合金a1	合金b1		13.89	11.44	54	15.03	1
16	16 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.10Zr	1820	小田子 1000 ← 1			13.97	12.33	97	15.20	8
1	17 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.20Zr	1920	合金a2	合金b1		13.98	12.58	97	15.24	86
- 22	18 Fe-24.9Nd-5.4Pr-0.4Dv-1B-0.05Cu-0.2Al-0.5Co-0.25Zr	1870				13.93	12.81	86	15.21	97
6	19 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.05Cu-0.2Al-0.5Co-0.10Zr	1800	41 41	合金b1+		13.81	12.39	96	15.05	223
2	20 Fe-24 8Nd-5.5Pr-0.3Dv-1B-0.05Cu-0.2Al-0.5Co-0.20Zr	1960	1	合金b2		13.75	12.55	97	15.01	263

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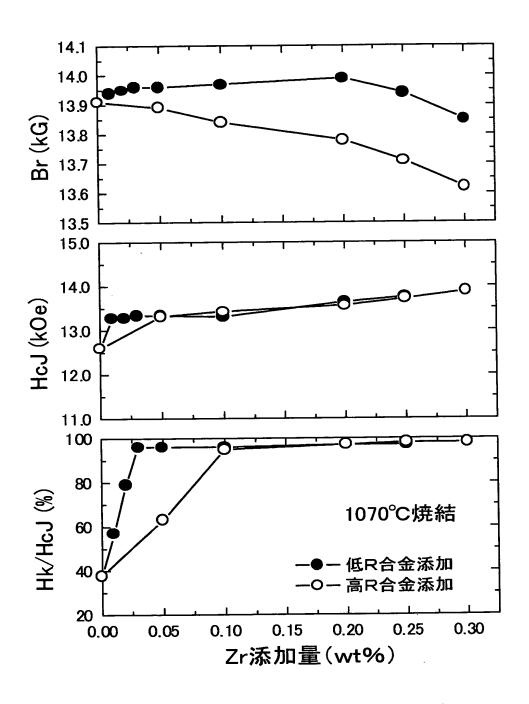
R	<u>到</u> 分					[-	1 11. /11.	× 101.0	
2	最終組成(wt. %)	酸素量 (muu)	飯R哈 衛	酮RA 金	焼結温度	Br (kG)	(kOe)	(%)	HcJ.	
		1210	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	今 令 令		13.94	13.24	86	15.26	
7	21 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.000u-0.2Al-0.000	2131	1		<u> </u>		000	2	15.06	
%	22 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.01Zr	1260				13.94	13.23	_ D	13.20	
i č	22 E - 2 A 9N 4 - 5 4 Pr - 0 4 D V - 1 B - 0 05 Cu - 0.2 A I - 0.5 Co - 0.02 Zr	1180				13.95	13.19	94	15.27	
4	23 FE 24.51M 5.41 C.12 C.	1360	合金a1+	4		13.94	13.19	94	15.26	
Ž	1 Fe-24.9Nd 3.4F1 0.4D3	1110	合金a2	- 3 # 0		13.94	13.23	95	15.26	
~	25 Fe-24.9Nd-5.4FF-0.4Dy-1D-0.0004 0.2Al 0.300					12 04	13.28	95	15.27	
<u>ة</u>	26 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.10Zr	1170				5.0	07.01	3 8	10 11	3/
	77 Fe-24 9Nd-5.4Pr-0.4Dv-1B-0.05Cu-0.2AI-0.5Co-0.20 <u>Zr</u>	1200				13.91	13.55	c _B	/7.61	<u> </u>
	28 Fe-25 NN4-5 4Pr-0 3Dv-1B-0.05Cu-0.2AI-0.5Co-0.05Zr	1300	<u>.</u>	4	1050°C	13.88	12.96	96	15.18	/
-	201 C 20:013 C:11 C 202 J	1370	合金a1			13.85	12.76	97	15.13	
	9 FE-24.0NG-0.3FF 0.3Dy 1D 0.3CG 0.35 0.3CG 0.3C					13.68	12.58	86	14.94	
<u>~</u>	30 Fe-24.8Nd-5.5Pr-0.3Dy-1B-0.050u-0.2Al 0.300 0.505	╁-				4446	11.00	<u>ج</u>	15 27	
	31 Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.01Al-0.5Co-0.10Zr	1220				. .	02:11	3	i 6	
	32 Fe-24 9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.03Al-0.5Co-0.10Zr	1310	1 2 4 4 1 T			14.14	12.49	96 ——	15.39	
,	22 C = 1.03.2	1140	西班ao⊤ 合金a6			14.13	12.60	95	15.39	
	13 Fe-24:3140 - 3:4F1	1180	 			13.87	13.27	97	15.20	
,	34 Fe-24.9Nd-9.4PP-0.4Dy-1B-0.030d 0.00d 0.00d 0.00d	1230	_			13.61	13.00	96	14.91	
	35 Fe-24,9Nd-5,4Pr-0,4Dy-1B-0,05Cu-0,4Al-0,5Co-0,102r	1500								

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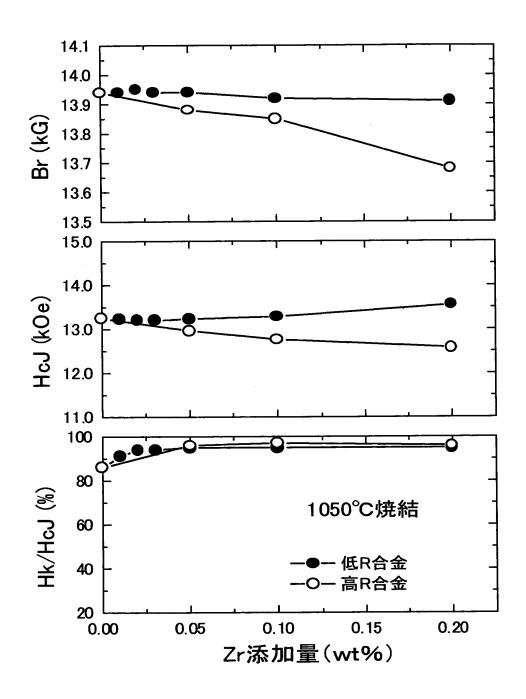
第4図



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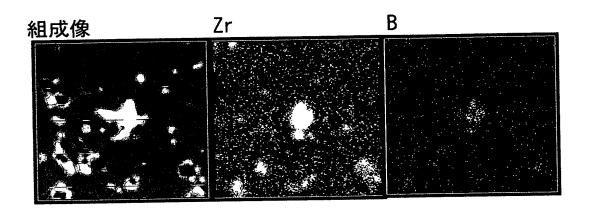
第5図



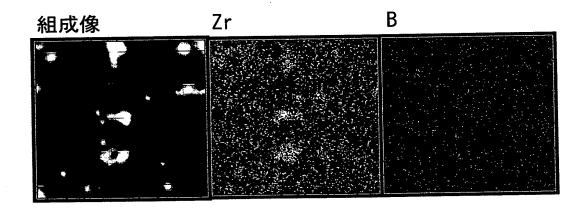
Hogan & Hartson 81864.0026 Gouichi MISHIZAWA et al. Method for Manufacturing a R-T-B... EV 324 110 454 US 17 Drawing Sheets; Sheet 6 of 17

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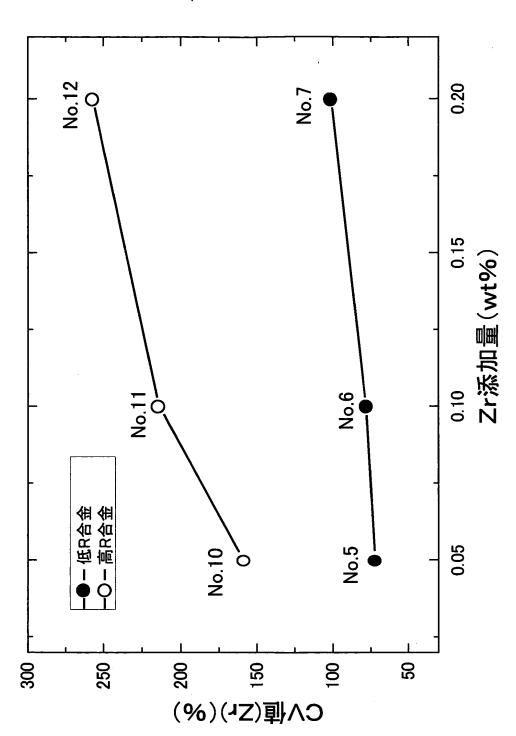


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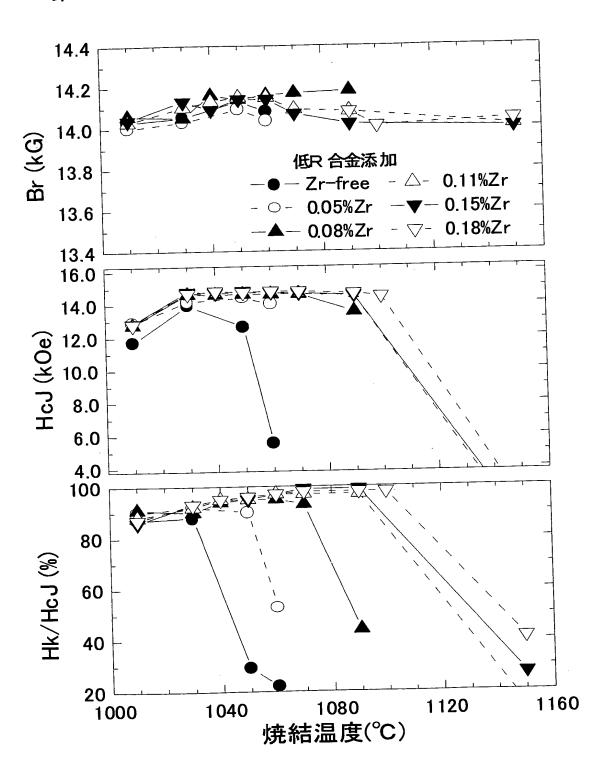
第9図

No.	最終組成(wt. %)	酸素量 (ppm)	焼結温度	Br (kG)	HcJ (kOe)	Hk/HcJ (%)	Br+0.1 × HcJ	CV値
36			1010℃	14.03	11.68	87	15.20	
37		680	1030℃	14.05	13.92	88	15.44	
38	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co	!	1050℃	14.13	12.64	29	15.39	
39			1060℃	14.08	5.53	22	14.63	
40			1010℃	14.00	12.84	90	15.29	
41		670	1030℃	14.03	14.17	92	15.44	
42	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.05Zr		1050℃	14.09	14.37	90	15.53	
43			1060℃	14.04	14.00	_53	15.44	
44			1010℃	14.06	12.76	91	15.33	
45			1030℃	14.05	14.61	90	15.51	
46			1040℃	14.16	14.59	94	15.62	
47	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.08Zr	870	1050℃	14.14	14.61	95	15.60	
48]	1060℃	14.16	14.60	95	15.62	
49		1	1070℃	14.17	14.60	93	15.63	
50			1090℃	14.18	13.51	44	15.53	
51			1010℃	14.03	12.85	88	15.31	65
52			1030℃	14.10	14.67	92	15.57	71
53			1040℃	14.13	14.66	95	15.59	77
54		700	1050℃	14.15	14.71	95	15.62	75
55	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.11Zr		1060℃	14.15	14.69	97	15.62	72
56		1	1070℃	14.09	14.61	97	15.55	75_
57		ļ	1090℃	14.08	14.49	97	15.53	_81
58		1	1150℃	14.01	0.11	14	14.02	142
59			1010℃	14.04	12.85	86	15.32	68
60		1	1030℃	14.13	14.72	93	15.60	75_
61		ł	1040℃	14.09	14.77	95	15.57	72
62		740	1050℃	14.14	14.79	95	15.62	80_
63	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.15Zr		1060℃	14.14	14.72	97	15.61	85
64			1070℃	14.07	14.66	99	15.53	88
65			1090℃	14.02	14.51	99	15.47	91
66			1150℃	14.00	0.50	27	14.05	150
67			1010℃	13.98	12.81	87	15.26	<u></u>
68			1030℃	14.07	14.67	93	15.54	
69			1040℃	14.13	14.80	95	15.61	
70			1050℃	14.05	14.72	96	15.52	
71	Fe-24.9Nd-5.4Pr-0.4Dy-1B-0.05Cu-0.2Al-0.5Co-0.18Z	r 810	1060℃	14.18	14.78	97	15.65	
72		1	1070℃	14.03	14.76	98	15.51	<u></u>
73			1090℃		14.63	98	15.54	
74	[1	1100℃	L	14.45	98	15.46	
75			1150℃	1	1.75	41	14.22	

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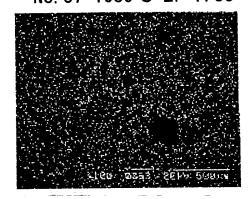


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No. 37 1030°C Zr-free



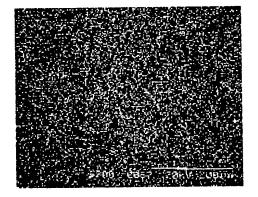
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No. 43 1060°C 0. 05%Zr



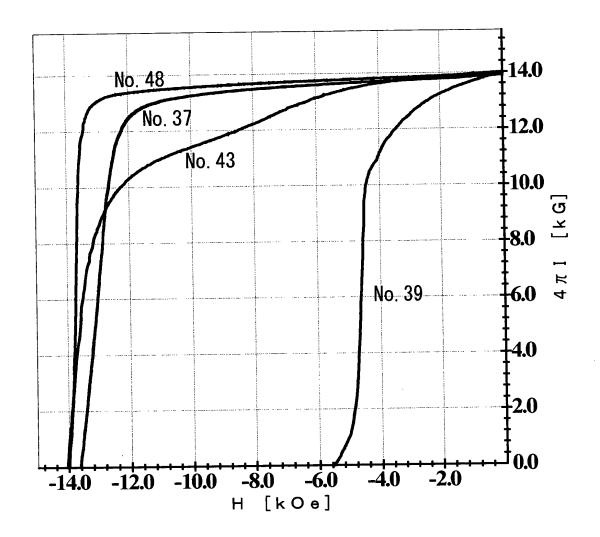
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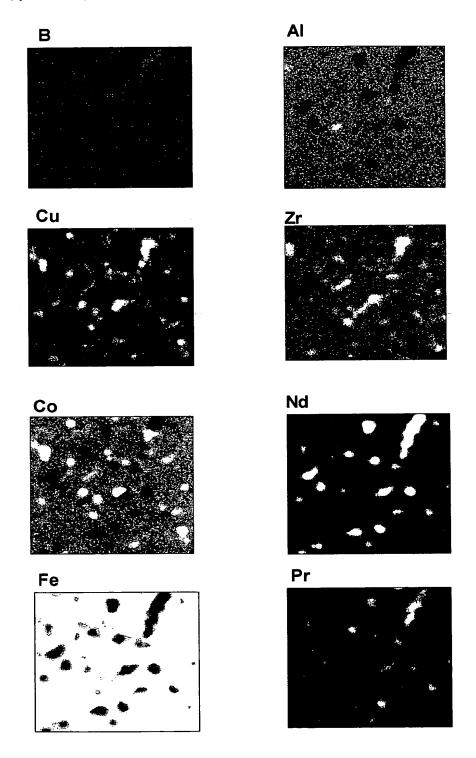
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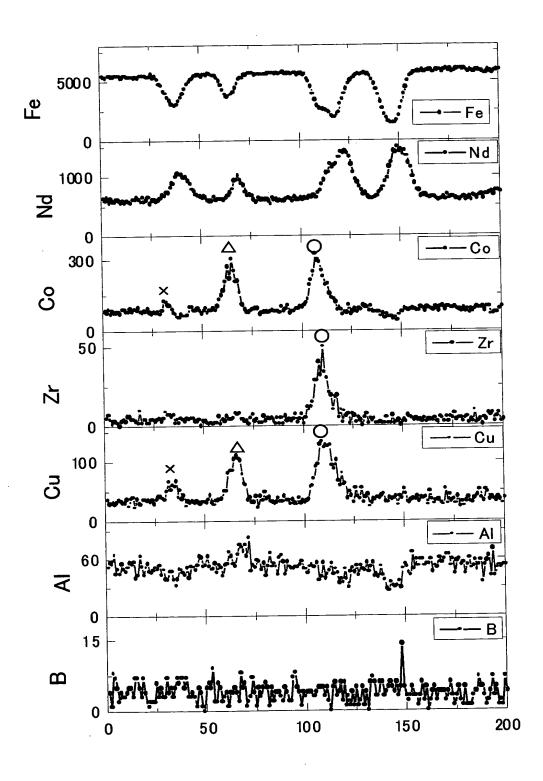
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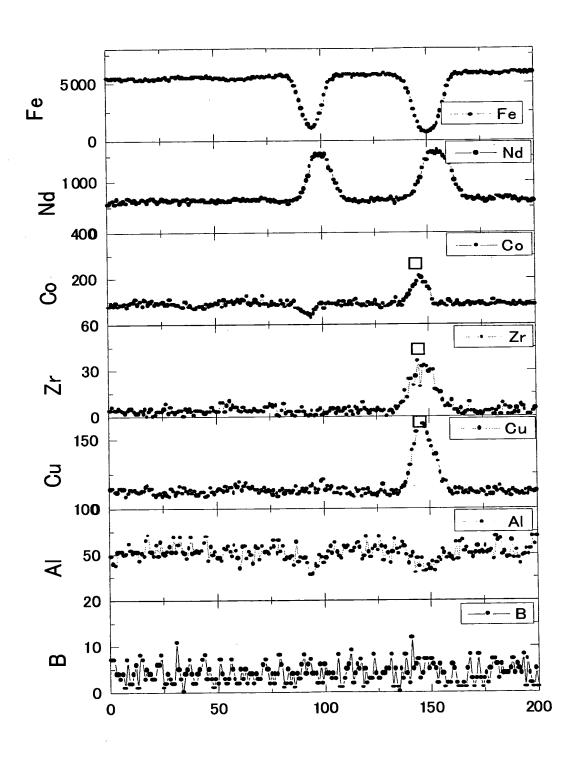
第14図



Hogan & Hartson 81864.0026 Gouichi MISHIZAWA et al. Method for Manufacturing a R-T-B... EV 324 110 454 US 17 Drawing Sheets; Sheet 14 of 17

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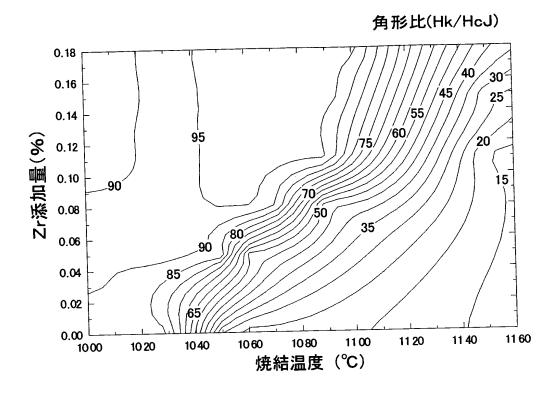
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				‡ •	ă	٦ 3	HoJ HK/HoJ Bryo.	1.0	
2		角 R 合金	画R合街	画RG 新新道政	(kG)	(kOe)	(kG) (kOe) (%) ×HcJ	S 왕 ×	
				00000					
	25 P. 10-02 P. 10-0 DEC. 1-0 201-0 137r	哈金a4		1060 C 14.42 12.62	14.42	12.62	& 6	15.68	
2	FeZ5.UNG-5.5FT IB0.0500 0.200 0.300				9	1		15.41	
7	77 E2-22 2NJ-5 4P-2 10/-18-0 05CU-0.2AI-0.5Co-0.13Zr		今余h1	1070°C	13.68	5./	ĥ		
	Le_zo.ziva o.t. z.:00 z.				1010	19 10 93 93	98	15.51	
78	78 Fe-20 6Nd-5 4Pr-4.7Dv-1B-0.05Cu-0.2AI-0.5Co-0.13Zr P. 14 21 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1				2	20.50			
				1090°C _{12.37} 30.51	12.37	30.51	94 15.42	15.42	
2	79 Fe-19 0Nd-5 3Pr-7.2Dv-1B-0.05Cu-0.2Al-0.5Co-0.13Zr								

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S S	最終組成(wt. %)	酸素量 (mdd)	低R合金	低R合金 高R合金 焼結温度	焼結温度	Br (kG)	HcJ (kOe)	Br HcJ Hk/HcJ Br+0.1 CV値 (kG) (kOe) (%) ×HcJ	Br+0.1 × HcJ	CV値
] &	80 Fe-28 3Nd-0 1Dv-1B-0 03Ci-0 05Al-0 2Co-0 07Zr	720	合金a7	合金b4	合金a7 合金b4 1070°C 14.62 13.1 98 15.93	14.62	13.1	98	15.93	77
<u> </u>	81 Fe-26.9Nd-4.8Pr-0.2Dv-1.3B-0.3Cu-0.25Al-4Co-0.24Zr	980	合金a8	合金b5	合金a8 合金b5 1020°C 13.88 15.3 96 15.41 9	13.88	15.3	96	15.41	86

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